United States Court of Appeals

for the Second Circuit

EXHIBITS

M/V "HELLENIC SAILOR" Sept. 1962

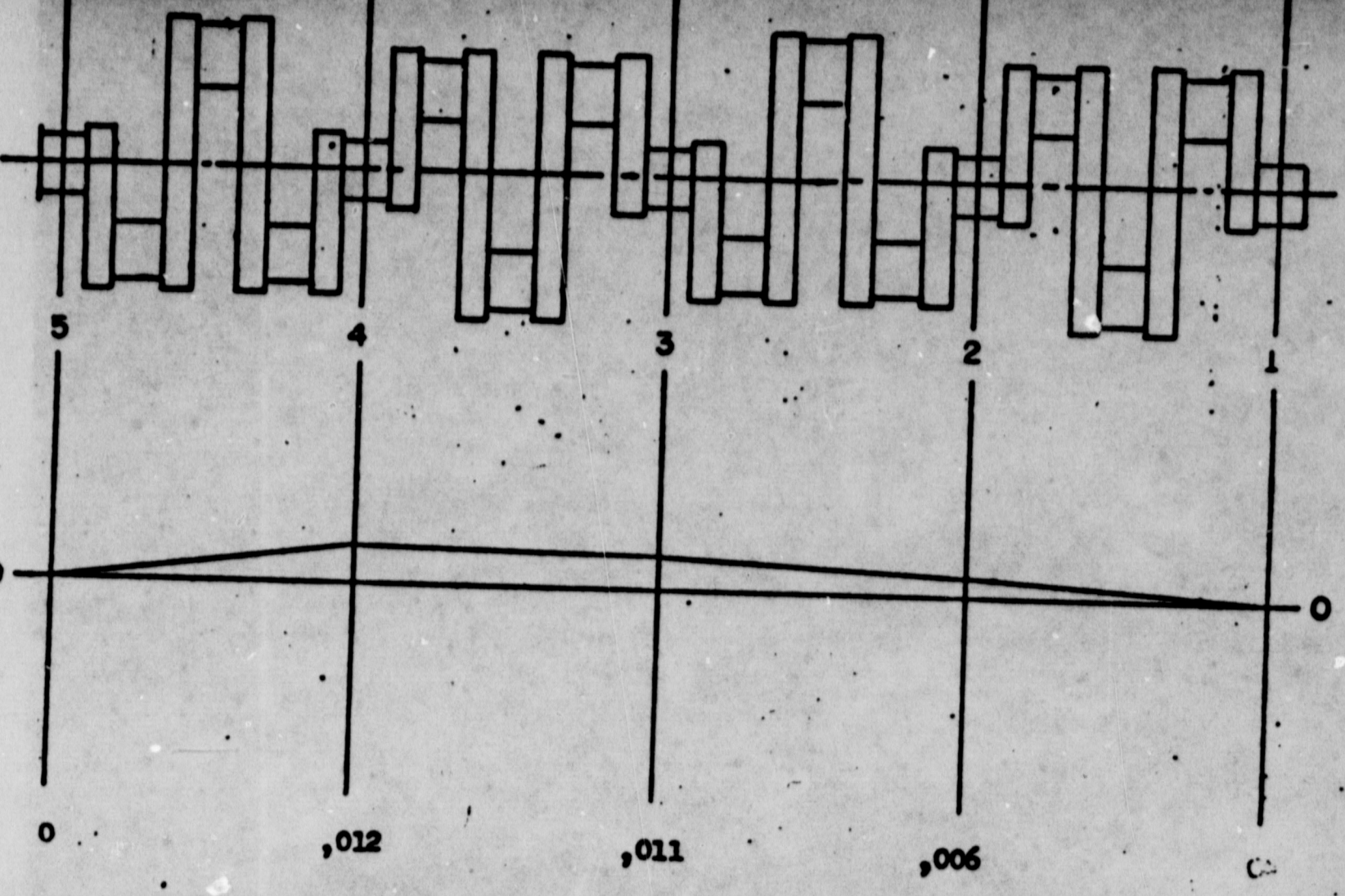
BRIDGE - GAGE READINGS AFTER COMPLETION OF REPAIRS.

No. 1: ,132
No. 2: ,104
No. 3: ,115
No. 4: ,095
No. 5: ,111

Deflection of M. E. Crank-shaft in 1/100 M. M. - Turning AHEAD. Readings indicate Clock position.

No. 1:	0 + 34	+ 64	+ 30	- 03
No. 2:	0 + 12	+ 22	+ 07	- 02
No. 3:	0 + 14	+ 35	+ 18	- 0
No. 4:	0 + 06	+ 40	+ 25	- 05

Defls at 30° from
S/2/63 HJ



Average of four readings: No. 1 Center Crank 45° B.T.D.C. - 45° A.T.D.C.
45° B.B.D.C. - 45° A.B.D.C.

lenic Sailor" .... DATE: ... Sept. 17 - 62

TELESCOPE - READINGS ALONG
CRANKSHAFT ON DOXFORD ENGINE

WD.: 24' - 00

FT: 26' - 00

GOLTEN MARINE CO., INC.

Dec 13 '62 Sept 17

SUN SHIPBUILDING & DRY DOCK CO.
CHESTER, PA.

September 14, 1960

erican Bureau of Shipping
saries Building - 6th Floor
, Akti Poseidonos
raeus, Greece

tention : Mr. A. A. White

bject : Sun Shipbuilding and Dry Dock Co. Hull #177
Sun-Doxford Opposed Piston Oil Engine
4 Cyl - 32" Bore x 55" + 40" Stroke

ference : (a) A.B.S. letter (File MF) to Sun, dated Sept. 8, 1960

closure : (A) Sun Sketch showing deflection of crankwebs.

ntlemen:

We acknowledge receipt of Reference (a), and in reply lease be advised as follows:-

1. Materials for principal forged steel engine parts

Transverse Pins (Center & Ends), Connecting Rods, & Upper Piston Rods.

Nickel Steel	- Annealed
Tensile Strength	- 85,000/90,000 P.S.I.
Yield Point, Min.	- 62-1/2% of T.S.
Elongation in 2", Min.	- 25%
Reduction in Area	- 45%
Chemical Properties	
Nickel	- 2.75% Min.
Carbon	- 0.45% Max.
Phosphorus	- 0.04% Min.
Sulphur	- 0.045% Max.

Center & Side Crossheads, Crankshaft Side Pin & Web

Carbon Steel	- Annealed
Tensile Strength, Min.	- 70,000 P.S.I.
Yield Point, Min.	- 55% of T.S.
Elongation in 2", Min.	- 22-1/2%
Red. of Bend to 180°	- 3/8"

Debt Xt 71
for id WB 8p 7 1/73

SUN SHIPBUILDING & DRY DOCK CO.
CHESTER PA.

Crankshaft Center Web & Center Pin

Nickel Steel	- Annealed
Tensile Strength, Min.	- 86,000 P.S.I.
Yield Point, Min.	- 62-1/2% of T.S.
Elongation in 2" Min.	- 25% (Longitudinal)
Red. of Bend to 180°	- 1/2"
Reduction in Area	- 45% (Longitudinal)
Chemical Properties	
Carbon	- 0.35% Max.
Sulphur	- 0.045% Max.
Phosphorus	- 0.04% Min.
Nickel	- 3.0% Min.

Ordinary medium carbon steel, equivalent to AEC Grade 2, is not recommended for Transverse Pins.

2. We enclose one (1) copy of Enclosure (A) showing recommended deflections of crank webs, when jacking over with the turning gear.

Very truly yours,

D. MYLREA

D. Mylrea
Chief Engineer

DLB:ja

SUN SHIPBUILDING & DRY DOCK CO.
CHESTER, PENNA., U.S.A.
ENGINEERING DEPARTMENT

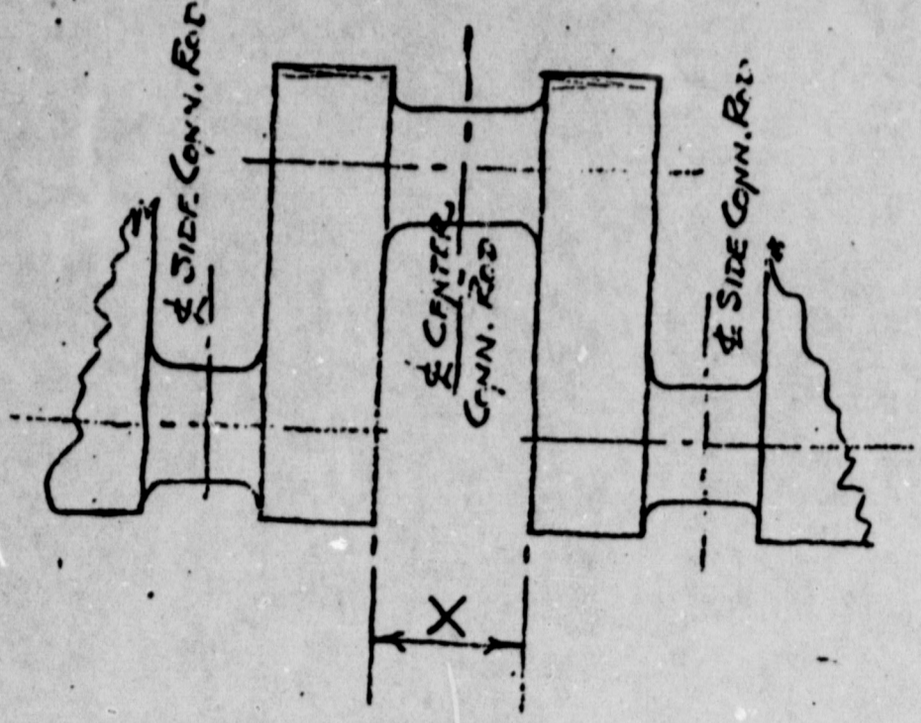
32" M.S.A.C. Cup-Locked Engines

To Check Deflection of Crankpin Webs - When Jacking Over With Turning Gear.

(a) With New Bearings - No Connecting Rods Installed on Shaft .005"/.006" Deflection at X

(b) With New Bearings and Connecting Rods Installed on Shaft .010"/.012" Deflection at X

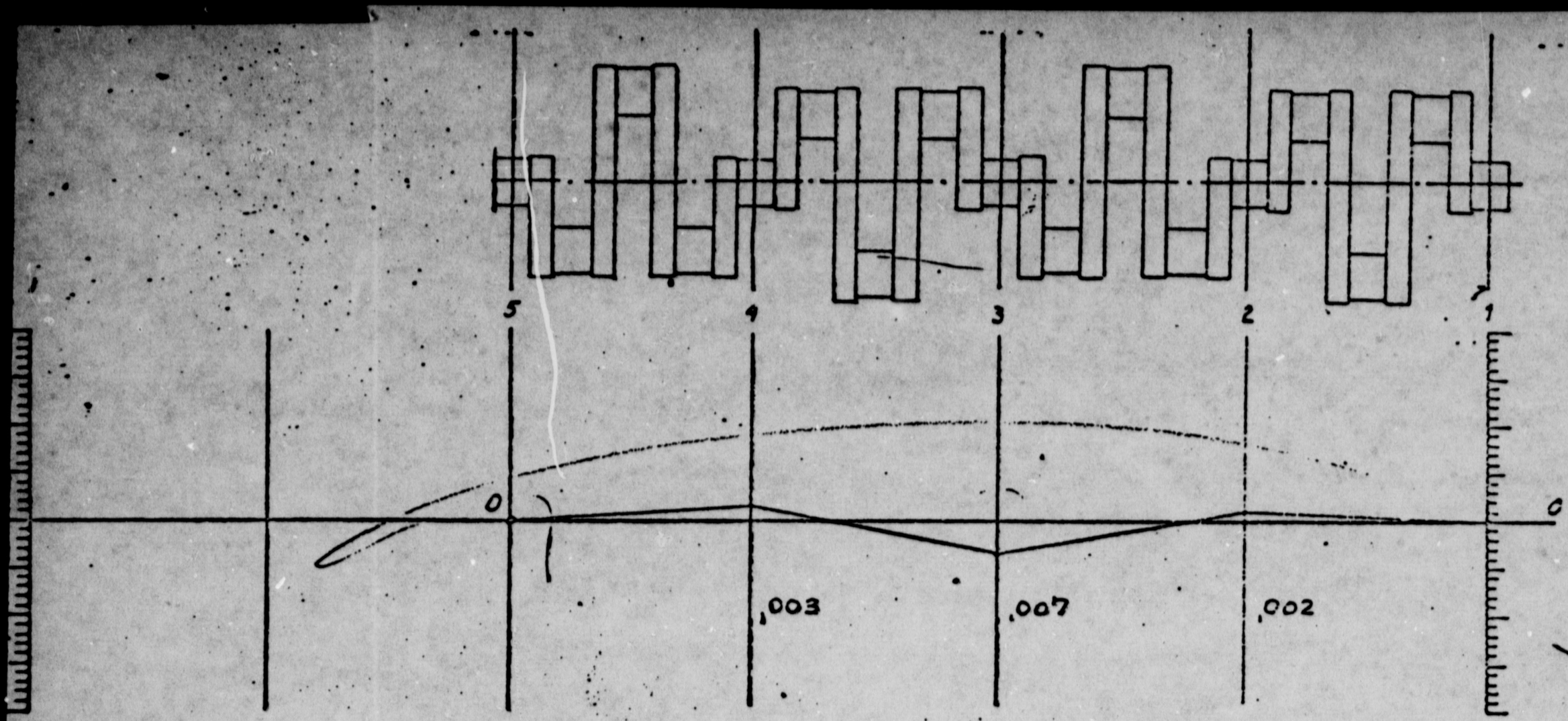
(c) With Worn Bearings and Connecting Rods Installed on Shaft .020"/.022" Deflection at X



Draft xt 71-A
per ltr WDS 1/27/43

MADE BY
ENGINEER
APPROVED
DATE: April 20-43

DATE
DRG. NO.
SHEET NO



M/V "HELLENIC SAILOR"

DATE: Nov. 20 19 63

REMARKS:

DRAFT:
FWD. 21'3"
AFT. 21'7"
WIRE ,016
WEIGHT 30 lbs.

WIRE-GAGE-READINGS ALONG CRANKSHAFT ON DOXFORD ENGINE.

GOLTEN MARINE CO., INC.

CA/SE/mw

November 29, 1963

A. Papayiannis, Chief Engineer
S. Hellenic Sailor
Tavoularides & Co.
ost Office Street
xandria, Egypt

Subject: M. S. HELLENIC SAILOR
LLOYD'S REGISTER OF SHIPPING
CONTINUOUS SURVEY OF MACHINERY &
CRANKSHAFT READING

r Mr. Papayiannis:

losed herewith please find the original of Lloyd's Register of
pping Certificate certifying the advancement of the Continuous
ey of Machinery as per text.

ill thank you to make the necessary entries in the book provided
the purpose and maintain the certificate in chronological order
rder that it may be produced upon request. We also enclose a
for the Master's file.

enclosed is a diagram of readings taken by Messrs. Golten
ne Co., Inc., showing the position of the crankshaft at the
ts indicated.

e sign the accompanying copy of this letter for acknowledgement
return same to this office.

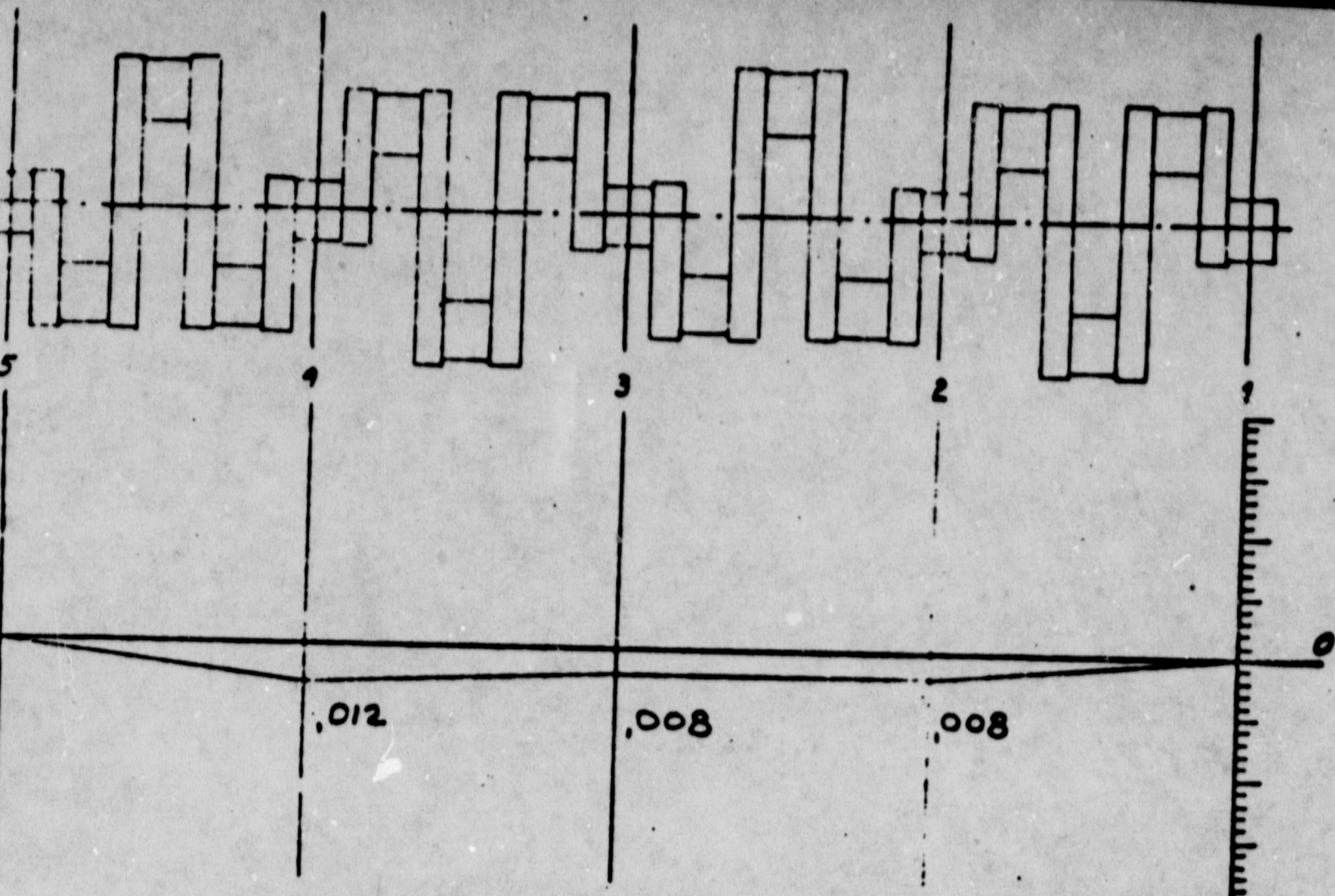
Very truly yours,
HELLENIC LINES LIMITED

CHARLES ALLAN

iraeus

SIGNATURE OF RECIPIENT

Dc/SE/ 37 Jan 64
8/22/23 SE



M/S "HELLENIC SAILOR"

9/8 - 1964

DRAFT: FWD. 16'-3" AFT 19'-6"

WIRE DIA: .016. TENSION: 30 lbs.

WIRE-GAGE-READINGS ALONG CRANKSHAFT ON DOXFORD ENGINE.

GOLTEN MARINE CO., INC.

CA/SE/mw

October 8, 1964

File #49

Mr. A. Papayiannis, Chief Engineer
M. S. Hellenic Sailor
c/o Hellenic Lines Limited
Pier Foot of 57th Street
Brooklyn, New York

Subject: M. S. HELLENIC SAILOR
MAIN ENGINE CRANKSHAFT READING

Dear Mr. Papayiannis:

Attached hereto please find your copy of crankshaft reading as taken by pilgrim wire on September 8, in New York.

Please note that the results appear to be good.

Thanking you, we are

Very truly yours,

HELLENIC LINES LIMITED

CHARLES ALLAN

attach.
cc: Piraeus

CA/IS E1 38-A-f.11
11-22-73 CA

Allow

w/v "HELLENIC SAILOR"

DRAFT:

FWD.: 10'-10"

AFT: 22'-8"

DATE: 2-1-66

WIRE: .018" DIA

WEIGHT: 42 lbs.

WIRE-GAGE-READINGS ALONG CRANKSHAFT ON DOXFORD ENGINE

GOLTEN MARINE CO., INC.

April 22, 1966

CA/SE/dk
File #49

Mr. G. Kalimeris, Chief Engineer
M. S. Hellenic Sailor
c/o Mohamed Saleh Y. Behbehani
P. O. Box 370
Kuwait, State of Kuwait

Subject: M. S. HELLENIC SAILOR
CRANK SHAFT DEFLECTIONS

Dear Mr. Kalimeris:

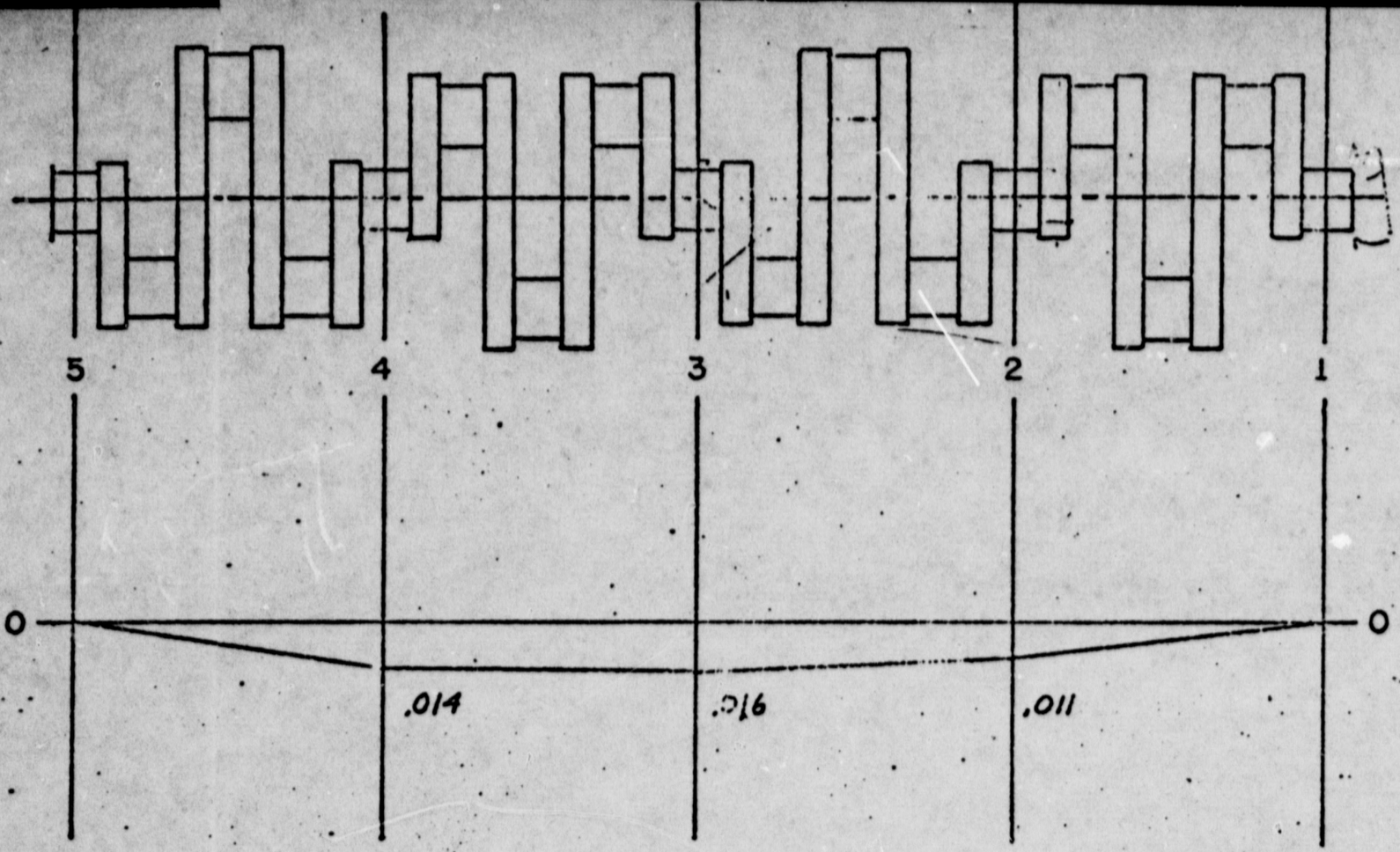
It occurs to us that we did not send you a copy of the crank shaft deflections as taken during your last visit to New York. If this is the case, please include the enclosed copy in your files.

Very truly yours,

HELLENIC LINES LIMITED

CHARLES ALLAN

Enc.



M/V HELLENIC SAILOR

DRAFT:

FWD.: 14'-3"

AFT: 25'-0

DATE: 8-2-66

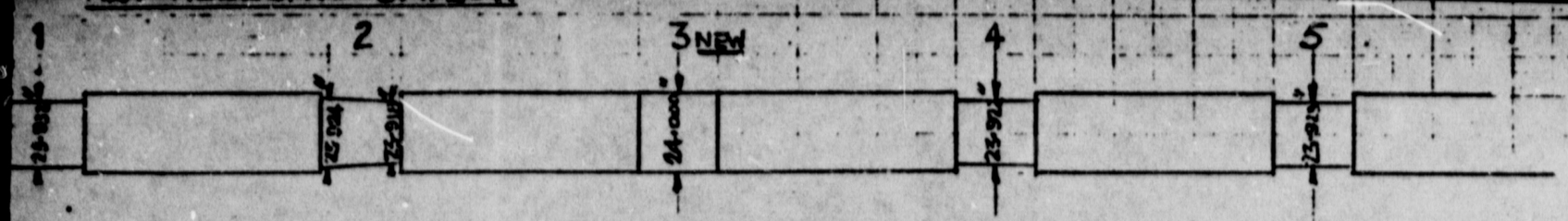
WIRE: .016"

WEIGHT: 30 lbs.

WIRE-GAGE-READINGS ALONG

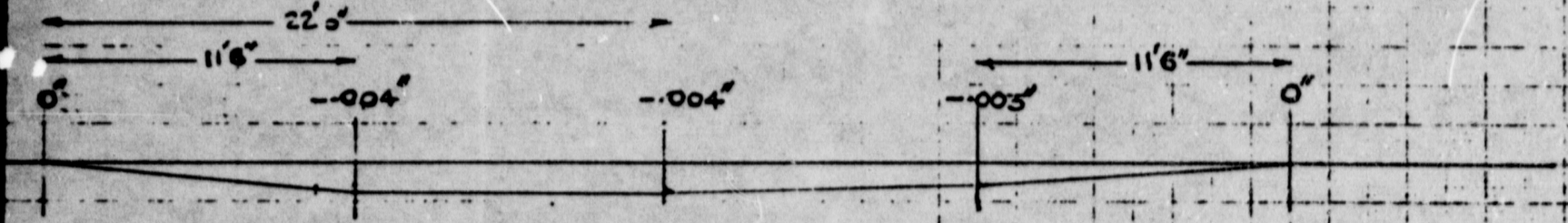
CRANKSHAFT ON DOXFORD ENGINE

GOLTEN MARINE CO., INC.



NOS. 1 - 2 - 4 & 5 JOURNALS DIAMETERS REDUCED REPAIRS SAN FRANCISCO 1948

NO. 3 NEW CRANK SECTION WITH JOURNAL ORIGINAL DIAMETER



JOURNAL DIAMETERS

No 1 - 23·932"
" 2 - 23·921" (MEAN)
" 3 - 24·000" (NEW)
" 4 - 23·922"
" 5 - 23·929"

½ DIFFERENCE DIAMS. FROM ORIGINAL

No 1 — 0·032"
" 2 — 0·040"
" 3 — 0·000"
" 4 — 0·039"
" 5 — 0·035"

MICROMETER READINGS

-0·102"	0·064"	0·008"	0·062"	0·105"
0·000"	0·050"	0·066"	0·050"	0·000"
0·102"	0·114"	0·074"	0·112"	0·105"
0·032"	0·040"	0·000"	0·039"	0·035"
0·070"	0·074"	0·074"	0·073"	0·070"
0·070"	0·070"	0·070"	0·070"	0·070"
0"	-0·004"	-0·004"	-0·003"	0"

WIRE - DIAMETER = 0·015"

WEIGHT - 30 LBS.

WIRE SAG CONSTANT

No 1 AT 0" = 0·00"
" 2 " 11'6" = 0·050"
" 3 " 22'0" = 0·066"
" 4 " 11'6" = 0·050"
" 5 " 0" = 0·00"

DRAUGHT

FORWARD - 12' 0"
AFT - 15' 0"

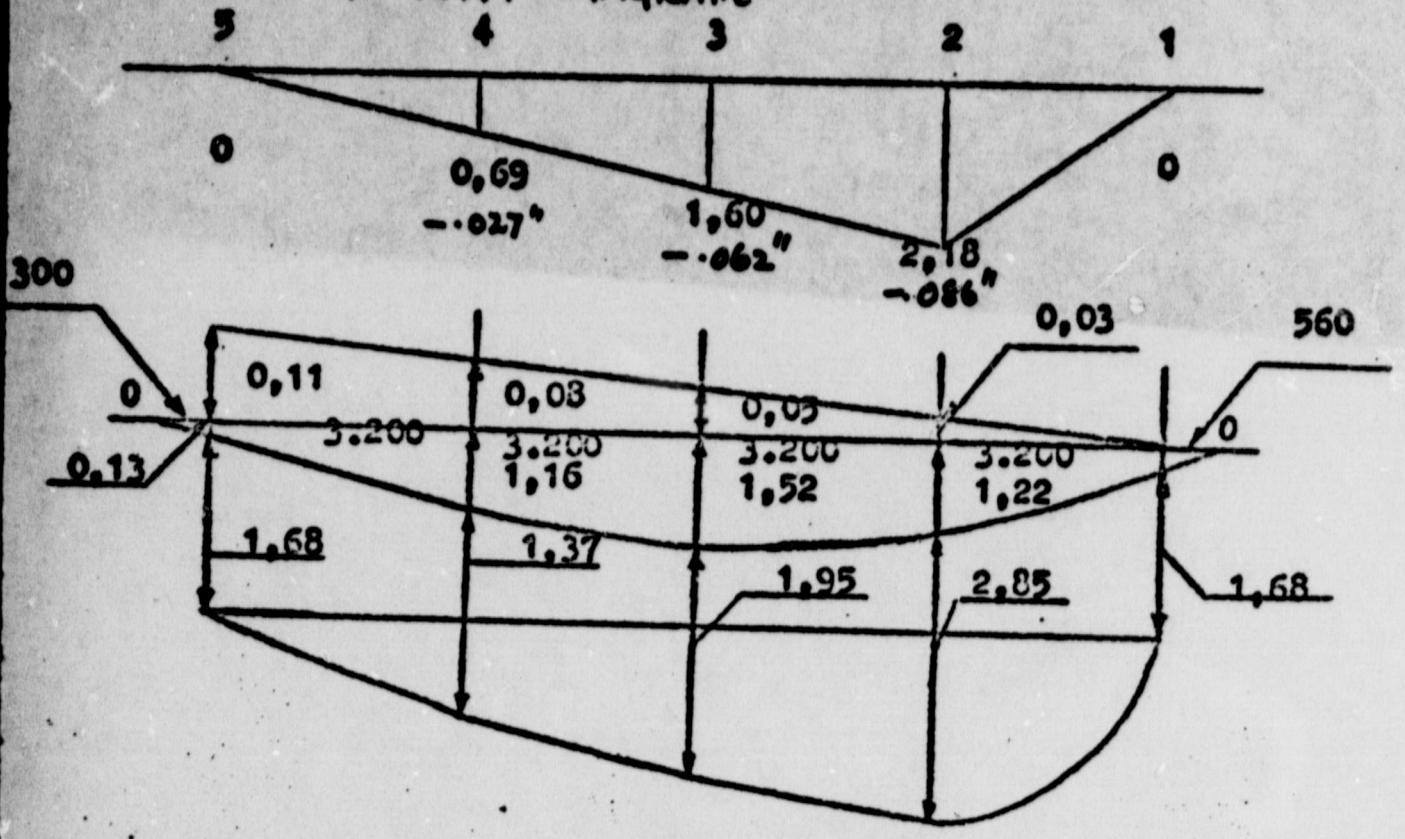
FINAL READINGS AFTER COMPLETION OF REPAIRS

BOMBAY — AUGUST 16th 1948

M/n. " HELLENIC SAILOR "

Controllo con lenza asse a manovella in data 1/11/1960

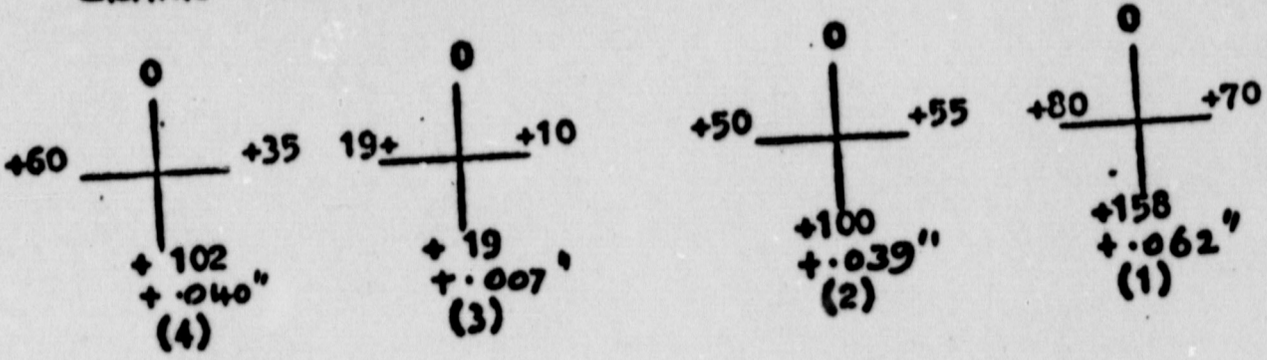
WIRE ALIGNMENT DIAGRAM



1,92	2,61	3,52	4,10	1,92
	1,92	1,92	1,92	
0	0,69	1,60	2,18	0

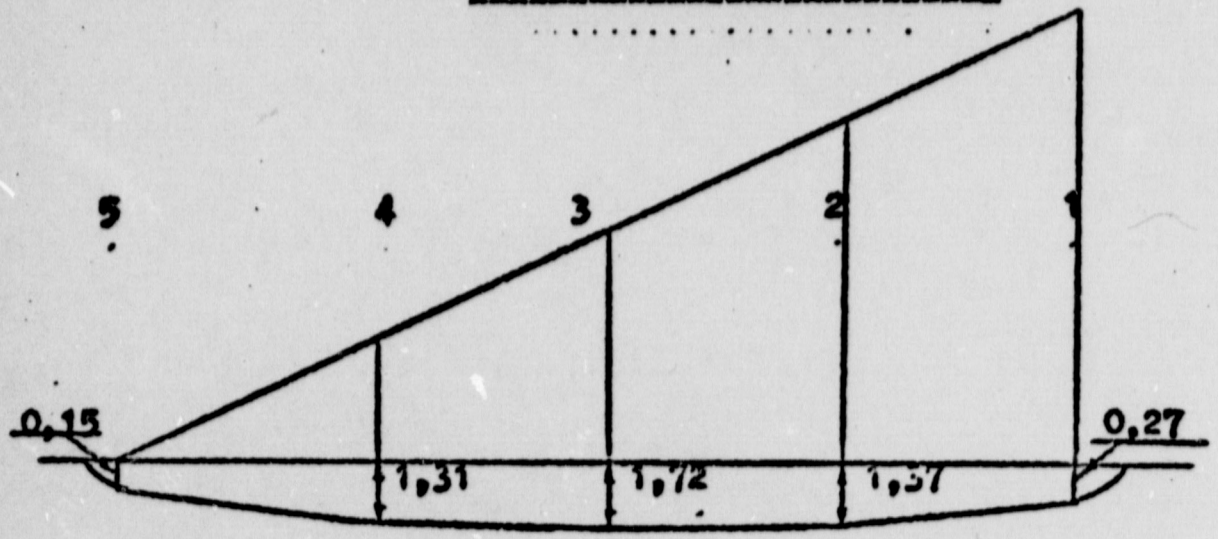
FLESSIONI RILEVATE IN DATA 31/10/60

CRANK WEB DEFLECTIONS



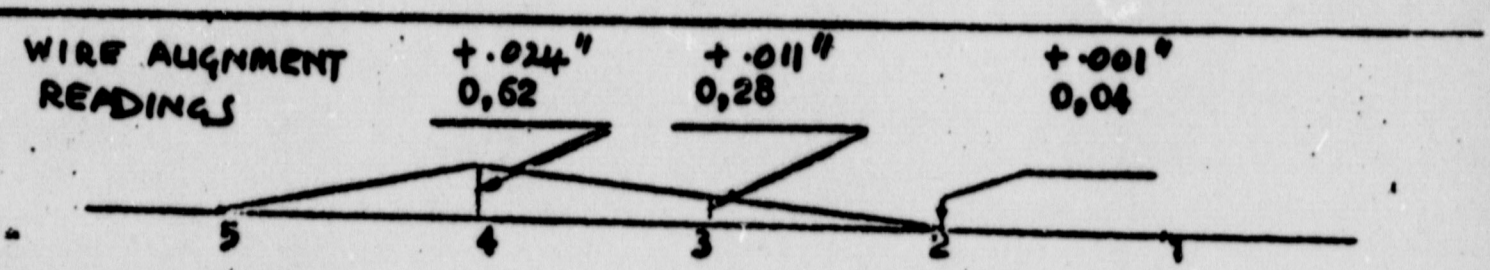
Defls ex 3/4 dia. w
8/3/33 [illegible]

M/n. " HELLENIC SAILOR "



	131-	172 -	137-	0,27-
	15	15	15	15
0				
	1,16-	1,57-	1,22-	0,12-
	3	6	9	-12
0				
	1,13	1,51	1,13	0

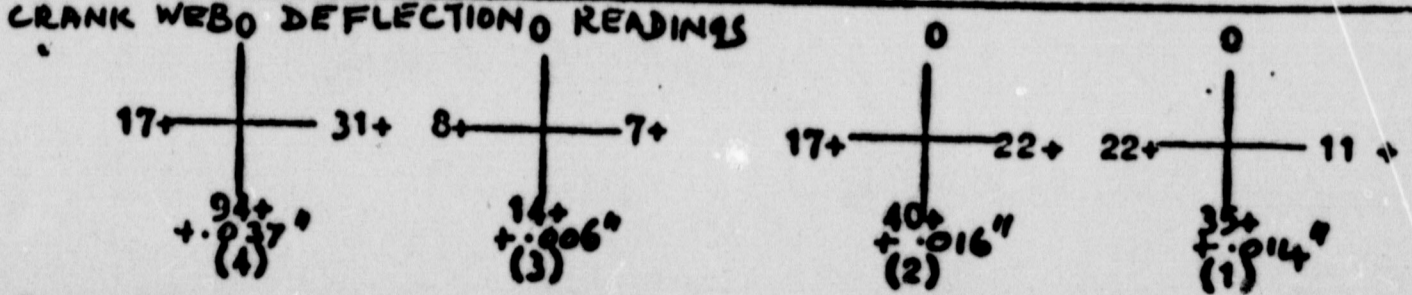
WIRE ALIGNMENT READINGS



ETTURE AL 23/11/60

592	417	413	475	592
592	530	564	588	592
592	592	592	592	592
—	530	564	588	—
0	+62	+28	+ 4	0

CRANK WEB DEFLECTION READINGS



Controllo con lenza asse a manovella dopo rimetallamento dei cuscinetti di banco. Flessioni rilevate in data 23/11/60.

READINGS AFTER REMETALLII THE BEARINGS —

RECAPITULATION OF MAIN ENGINE CRANKSHAFT ALIGNMENT READINGS FROM SEPTEMBER, 1962 UNTIL OCTOBER, 1967 AND THE CRANK WEB DEFLECTION READINGS AS RECORDED IN 1962 WITH THE BOTTOM CRANK WEBS DOWN - BOTTOM END PIN UP FOR THE M/V HELLENIC SAILOR

The crank web deflections, as measured with the webs in a down position, and after repairs to the vessel's main engine in September of 1962 were as follows:

#1 Main Crank	.025"
#2 Main Crank	.009"
#3 Main Crank	.014"
#4 Main Crank	.016"

There is no evidence of crank web deflection having been taken after that time and up to the time of the crank shaft fracture in December of 1967.

The following crank shaft alignment statistics at the drafts indicated were read to the witness (plus indicates "hog" and minus indicates "sag") :

	Draft		Main Bearings		
Date	Fwd.	Aft	No. 4	No. 3	No. 2
9/17/62	24'00"	26'00"	.+.012	+.011	+.006
11/20/63	27'3"	27'7"	+.003	-.007	+.002
9/8/64	16'3"	19'6"	-.012	-.008	-.008
2/1/66	10'10"	22'8"	-.024	-.038	-.017
8/2/66	14'3"	25'0"	-.014	-.016	-.011
10/11/67	12'6"	22'10"	-.032	-.042	-.032

Transverse beam

#3

#2

#1 Cylinder

USCR – upper side connecting rods

UBP in – connecting rod pin

LSCR – lower side connecting rod

BEP in – bottom end pin

AFT

SCRB – side conn rod bearing

BEPB – bottom end bearing

A

J main girder connecting rod (I shape structure)

I – entablature

C.R – main bearing

W – internal of the main bearing white metal

Upper piston

Combustion Area

Exhaust ports

Scavenge Ports

Lower piston

Side cross head

Main cross head

#3 section

#2 section

#1 section

T – top cover bearing of main crankcase

FWD

A

B

crankcase

SCR

WEB pin

BEP pin

Aperture

Tank Top.

Keel plate

DRILL FOR 2·5/8 DIA HEADLESS SCREWS 2½ LONG PEENED OVER

½ DIA HOLE DRILLED THRU WEB BEFORE PIN IS SHRUNK IN.

SEE DETAIL 'E'

2" DIA 13 TH PER IN.

TIGHT FITTING SPIGOT PLATE TO BE INSERTED FOR INSTALLATION OF COUPLING BOLT HOLES. SPIGOT MUST BE REMOVED BEFORE BOLTING UP FLANGES.

2·3/8 TAP ½ DEEP TO SUIT PC № 10

SEE DETAIL 'A'

WITHOUT GROOVE & KEYWAYS

WITH GROOVE & KEYWAYS

SEE DETAIL 'B'

SEE DETAIL 'C'

SEE DETAIL 'D'

4 DIA TAP 6½ DEEP

LUBRICATING OIL PIPES AS SHOWN ARE BETWEEN SECTIONS 1 & 2 ONLY FOR LUB. OIL PIPES BETWEEN OTHER SECTIONS SEE VIEW 'A'

10'-6½" BEARING CENTRES

45'-4"

END VIEW - LOOKING AFT.

DETAIL 'A'

DETAIL 'B'

DETAIL 'C'

DETAIL 'D'

DETAIL 'E'

DETAIL 'G'

VIEW 'A'

SECT 'G-G'

43